Multi-Phase Clock-less Switching Converter with EMI Noise Reduction

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Introduction

Table: Power Supply and Why multi-phase

<table>
<thead>
<tr>
<th>DC Input</th>
<th>DC Output</th>
<th>Max. Output Current</th>
<th>Max. Output Current Step</th>
<th>Max. Output Current Slow Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V</td>
<td>1.5V</td>
<td>120A</td>
<td>100A/us</td>
<td>930A/us</td>
</tr>
</tbody>
</table>

Power supply demanded everywhere to provide appropriate voltage for electronic device

Demerit of Single-Phase Converter

Lo flows only through inductor Lo

Merit of Multi-Phase Converter

Tracking PWM2 with PWM1 without clock is demanded. Inductor L1 and L2 will go shares with Lo

L1 and L2 small

This work

Main Power Stage

Sub Power Stages

Four-phase Ripple Control Converter

Generation of Four-Phase PWM

Results and Discussion

Current Balance

Single and multi-phase Comparison

V_{thres} : 3V

Spectrum of Conductive Noise

Conductive Noise and V_{ref}

Conclusion

- Design of good relationship between conductive noise and reference voltage for COT pulse is proposed
- Four-phase ripple controlled converter with EMI reduction is proposed
- Low output voltage ripple, Fast response
- Current balance is very good even at large output current